CULTURE, GENDER AND TECHNOLOGY-ENHANCED LEARNING: FEMALE AND MALE STUDENTS' PERCEPTIONS ACROSS THREE CONTINENTS

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ABSTRACT

With the on-going "Learning Culture Survey", we aim to foster the implementation of culture-sensitive education. The motivation of this study is based on the need of a better understanding of the reasons for intercultural conflicts in education. These issues are particularly pertinent to international learning scenarios, such as in urban education, or Internet-based e-Learning. The results of this research are geared towards a development of activities that prevent students from losing their initial learning motivation. With our standardized questionnaire, we collected and analysed data from Germany, Ghana, and South Korea. In such a comparative culture-related analysis, the population is usually considered as a whole, regardless of the respondents' socio-cultural differences and assuming a single representative value per item. In this paper, we first analyse and discuss the results of our questionnaire' section "*Gender Issues*". Afterwards, we analyse the overall questionnaire data to focus on the extent to which female and male students' answers differed. Finally, we engage in a discussion to what degree these differences impact the design of e-Learning scenarios.

KEYWORDS

Gender, Higher Education, E-Learning, TEL, Cross Cultural Study, Learning Culture Survey

1. INTRODUCTION

Increasing globalisation and mobility of learners and faculty is inevitably reflected in a cultural diversity in educational scenarios. On the one hand, increased cultural diversity presents itself as a very positive development: It helps learners to achieve competences in intercultural communication and collaboration. On the other hand, if the learners' experiences are not accordingly reflected, frustration through perceived intercultural conflicts could emerge. Loss of motivation could be a consequence, which is directly related to higher dropout rates. We consider education as a process in which learners are guided on their way to transform experiences into knowledge. Thus, we are looking for ways to support both students and educators, to better understand and deal with socio-cultural diversity in education. For this paper, we investigated learners' perceptions of education in different national scenarios through the lens on their gender as to understand its impact on e-Learning.

The "Learning Culture Survey" (LCS) is designed as an international study. The first data collection phase started in 2009/10; LCS is projected to continue for at least next decade. Our research focuses on supporting students to improve their learning outcomes by reducing cultural conflicts in education. For this purpose, we investigated learners' perceptions in different national and regional contexts. Originally, this investigation was designed to enhance the understanding regarding the relationship between culture and education. In particular, we were interested in answering questions how cultural bias affected the students' perceptions and expectations towards education and how we could improve the quality of education by taking such diversity into account when designing learning scenarios and materials.

Our hitherto accumulated insights led to a higher awareness regarding the character and impact of cultural diversity in education. We understand culture as "*the customs, beliefs, social structure, and activities of any group of people who share a common identification and who would label themselves as members of that group*" (Oetting 1993). As for practical scenarios, the results are being used to:

- Improve the preparative work of students and faculty members in terms of mobility;
- Support the students' and instructors' development of intercultural competences;
- Determine preventive activities to avoid cultural conflicts;
- Design culture-sensitive learning contents;
- Sensitise moderators of international learning groups regarding cultural conflict potential;
- Define conflict potential for learning resources that are to be adopted to new contexts.

The latter issue is eminent for the reuse of educational material, which is defined as one of the major advantages of e-Learning (Littlejohn 2003, Derntl & Motschnig-Pitrik 2003) and is particularly relevant for the further exploitation of Open Educational Resources (Richter & McPherson 2012; Richter 2011).

In the following, we use the term "Technology Enhanced Learning" (TEL) instead of "e-Learning". In the context of TEL, the Internet often is used to involve learners in a collaborative learning and authoring activities, provide learning material through Learning Management Systems or online publishing services, communicate with the learners via synchronous and asynchronous channels, and provide online assessments. Even in regions with low population density, the relatively low technological preconditions to provide TEL through the Internet often are fully met by both the institutions and the learners. Thus, involving students from very diverse contexts in a single course generally is feasible. In such settings, particularly the students' development of intercultural competences actually could be fostered. However, this option often keeps unused due several reasons: Prior research found that the most significant barrier for providers of TEL is the fear of unwillingly causing cultural (and other) conflicts (Richter & Ehlers 2011).

While we already were able to answer some general questions regarding the character of culture in education and educational culture (see section 2.2), raise our level of understanding regarding the impact of cultural influences on education, and determine improvement potential for several educational settings and scenarios, many issues still are not fully understood, and even completely new questions disclosed.

One of these not yet fully understood issues on which we focus in this paper, is the relationship between gender and culturally biased perceptions of students in education.

This paper is structured as follows: First, we provide an overview regarding the state of the art of research regarding "gender and TEL". Second, we introduce the design, setting and so far achieved general results of our Learning Culture Survey. Third, we present the analysis of results from our questionnaire's section "Gender Issues" and investigate our full data sets according to imbalances between female and male respondents. Finally, we discuss design implications for TEL.

2. THEORETICAL BACKGROUND

2.1 Gender and Technology Enhanced Learning

Gender differences and their effects on education have been thoroughly investigated in traditional classroom education. Issues regarded behaviour in groups, communication styles and patterns, generally different types of learning motivation, and barriers towards technology usage. While studies in the early 1990s indicated negative attitudes of women towards computers, in early two thousand, "*no significant differences between the genders in terms of competencies in the usage of general computer software as well as networking software*" remained (Atan et al., 2002, p.123). Bhushan (2008) confirmed these findings in the context of TEL in higher education. As major gender-specific issues in Computer Mediated Courses, Gunn et al. (2002) found differences in the self-reported levels of confidence, the ability to work successfully with technology, the use of support systems, different treatment according to laud and critique, and different patterns of interaction. Irani (2004) investigated differences in the self-reported levels of confidence in a longitudinal study. One of the findings of this study state that female learners felt frustration, particularly because of lacking support in technology-related tasks, such as completion of computer programming task. The study of Bostock and Lizhi (2005), which was focused on the use of asynchronous media, confirmed gender-related differences in communication patterns: Female students wrote more messages in all-female groups than in mixed-gender groups; while male students, in contrast, wrote more messages in mixed groups. However, the online discussions in all groups had a similar cognitive quality. Mikk and Luik (2005) analysed the perceptions of girls and boys (15-16 year old education) regarding the use of electronic textbooks and found that "*electronic textbooks with a high complexity of navigation and design of information endanger the*

learning efficiency of girls" (p.178). McSporran and Young (2001) found males at a disadvantage, as their skills to self-organize their learning processes and to engage in multitasking (dealing with external interruptions) were less developed. Yukselturk and Bulut (2009) also investigated gender differences according to self-regulated learning: They found "*test-anxiety*" as a significant variable for female and "*self-efficiency*" and "*task value*" as significant variables for male learners' achievement (p.20).

Our chosen topics for the questionnaire utilize and extend the framework proposed by Gunn et al. (2002): We investigate the necessity of gender-sensitive content design, the perceived confidence according gender-specific abilities to study social or technological issues and the perceived entry barriers, perceived treatment at the end of tasks, and the value of mixed gender and gender-separated workgroups.

2.2 The Learning Culture Survey: Background, Setting, and Priory Achieved Research Results

We designed and implemented a standardized questionnaire, which focuses on issues that generally are considered being culturally influenced. For our study, we defined the following thematic blocks:

- relationship between learners and instructors; perceptions towards laud and admonition; group building processes; communication style; behaviour in groups; (Hofstede & Hofstede 2005)
- time management; (Hall and Hall 1980)
- value of errors; the type of user activity; expectations towards personal coaching; (Henderson 1996)
- demand to influence learning contents; (Trompenaars and Hampden-Turner 2006)
- how and when feedback is to be provided. (Noelting et al. 2004)
- gender issues (Gunn et al. 2002)

As for the operationalization of these topics, we focused on issues that reportedly caused conflicts in educational scenarios. We eventually defined a total of 100 culture-related items, which we asked the students to evaluate on a four-point Likert scale (fully agree - fully disagree). We implemented a "force-choice" design (Lenski & Leggit 1960) because we wanted the participants to take a position that gets closest to what they actually think instead of expressing that they are undecided. With that decision we risked unwanted distortions (Garland 1991). Thus, we offered the opportunity to express if an item generally is not applicable to a particular context. This fifth option was positioned apart of the scale and, so far, has rarely been used. The questionnaire was pre-tested and was modified accordingly.

The first part of our investigation included Germany and South Korea, which according to the ATLAS survey from Müller et al. (2000) are the only countries that were considered being culturally homogenous. The questionnaire was provided in each of the national languages. In Germany, we designed the survey as an in-depth study and used the online version. We had the chance to take full samples (inviting all students) of three regionally distributed universities (1,817 completed questionnaires, 2-5 % acceptance rate). To determine the scope of our results we needed a sample where we could distinguish between the results of the various faculties. As for South Korea, we chose a broad-based design by drawing from 39 universities from which we obtained 286 completed questionnaires. In this study, we wanted to explore if the responses show significant differences amongst the universities. Due legal reasons, we had to conduct the questionnaire in its paper-based version. In order to achieve at least a quasi-random sample, we selected the students by following a random route algorithm (Kromrey 2006). The acceptance rate was around 50 %. For the analysis of the responses, we followed the recommendation of Baur (2008) for ordinal-scaled data: We binarised the results into positive and negative outcomes and focused our analysis on the percentage of positive answers.

One of the most relevant questions was related to the contextual transferability of our results. Hofstede & Hofstede (2005) suggest that culture, if related to value-systems, generally is a matter of national bias, and without regard of the context in which culture-specific results were achieved, these are transferable to any other context. This assumption, however, was challenged. Jandt (2004) for example expresses that "*cultures do not respect political boundaries. Border cities such as Juarez, El Paso, Tijuana, and San Diego can develop cultures that in some ways are not like Mexico or the United States*" (p.7). Inglehart and Wetzel (2010, p.555) argue that "*National means tell only part of the story. Measures of variance and skew within societies are also informative*".

Figure 1 illustrates three general results according to the questionnaire's topic "Role of the Lecturer", very similar answer patters between faculties (1), significant national differences and the value of the

spectrum of answers (2), and fully explainable differences between the context of higher education and professional training in Germany (3). We contrasted the results of our in-depth study in Germany according to the different faculties within each university and the average results of the three universities. We found a certain level of variability between the answers of the different faculties (including outliers) but after visualizing the results in a net diagram, we found that all responses followed a certain pattern. In the upper left of Figure 1/1, the results from the different faculties of the University of Cologne are exemplarily displayed. The same result was found between the average values of the German universities.

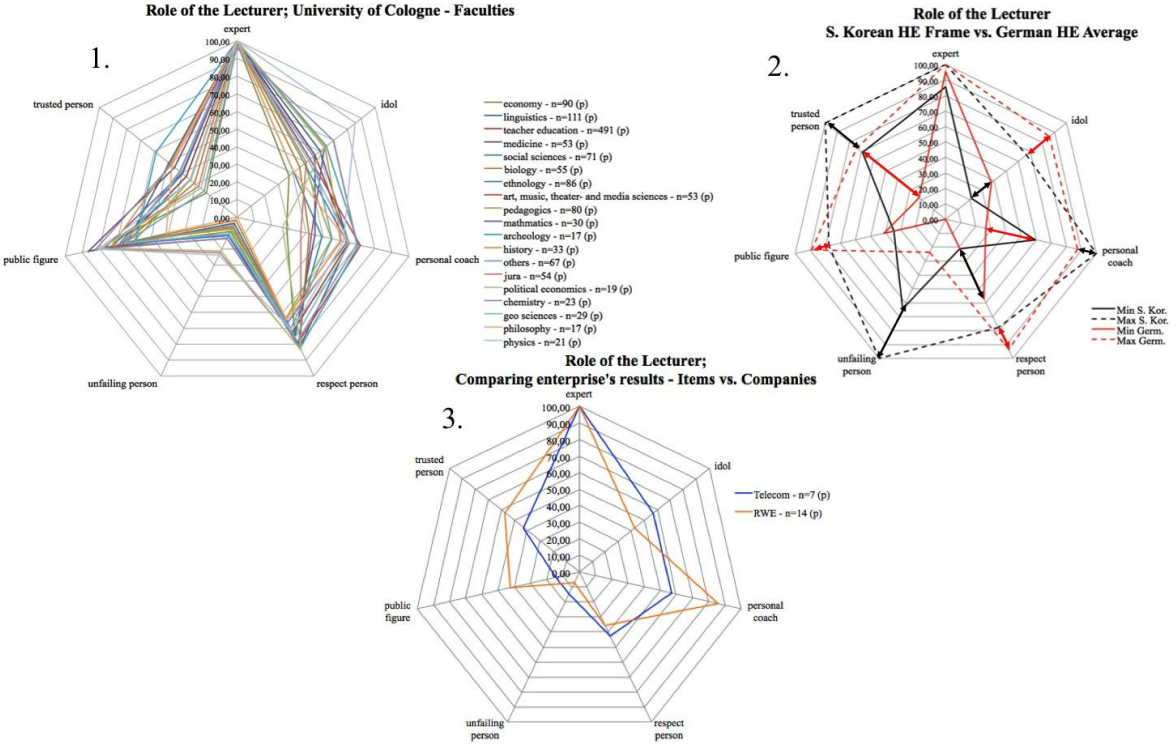

Figure 1. Role of the Lecturer: Learning culture in different settings

The answers that were received from students in the different universities in the South Korean sample also showed a particular answer-spectrum regarding most of the items. Yet each pattern again, was quite similar (apart of one university that just provided extra-occupational master programs. The patterns of the German and the Korean universities, however, were completely different from each other. In the upper right section of Figure 1/2, the answer-patterns from both, the German and the South Korean survey are displayed including each answer spectrum. What we can recognize in this figure is particularly that there are sections in each of the national contexts, which exceed the areas of the other. We came to the conclusion that the average percentage value is suitable to understand that generally there are differences but not sufficient to provide explanations for conflicts or emerging adaptation needs. Instead, we found that the spectrum of the answers within one context is a more meaningful indicator. Provided that local students are expected to cope with the educational style of any university within the country, and assuming that cultural bias at least to some extent is related to personal experiences (reflected in the answers), the answer-spectrum of all universities within a country could be understood as an indicator for the level of acceptance (Pless & Maak 2004) regarding diversity in education. If this is the case, then conflicts in intercultural education might particularly occur when a student from the one context meets conditions that are outside of the spectrum of his/her own context. In the figure, we marked related areas that accordingly indicate a high risk for conflicts with red and black arrows.

In the next step, we wanted to find out if higher education and professional training reveal similar results (Figure 1/3, centre). From the 30 invited German stock-noted enterprises, five granted their support and involved a small number of employees (each 25). From two of these enterprises, we eventually received seven and more completed questionnaires (pencil-and-paper form). Even though such small samples are far

from representative, we found surprising results: The responses of the two enterprises were quite different based on the results across the universities. All found differences could be explained considering specific characteristic of each enterprise/context. We concluded that generalizing our results from higher education to other educational contexts is inappropriate (Richter & Adelsberger 2012).

Previous literature suggests that cultural bias does not yet have its full impact on children below an age of 12 years but instead their curiosity has a higher influence on decision taking. In this context, Mitra et al. (2005) reported from their research project, which was highly related to curiosity, that children above 12 years did not like to participate or at least, quickly lost their interest. Buehler et al. (2012) investigated culture-related perceptions towards the experimental use of unknown technology. They found that children above the age of twelve years compared to younger children, reacted with the (for their particular cultural contexts) expected wariness. Thus, we did not investigate the context of school education.

Even with the limitation to a single educational context, another issue emerged according to country-wide transferability: How about countries that can not be considered culturally homogenous, such as countries in which several societies were joined into a single nation during the times of colonialisation, or in which more than one national language was spoken (Condon & Yousef 1975)?

By chance, we conducted a paper-based test study (same questionnaire, translated to English and French) in two universities in Cameroon, one located in the English and the other in the French language region; we received 30 completed questionnaires from each. We conducted an a-priori analysis considering different thematic blocks of the questionnaire: With a chance of over 98 %, each student's dataset was correctly appointed to the one or the other university. This is a strong indicator that transferring locally achieved results to the whole population of a country that culturally is not homogeneous is questionable. If a comprehensive understanding of culture shall be achieved, at least, regionally more distinguished investigations are required.

3. STUDY DESIGN

For this paper, we use our results from the German and the South Korean context and focus on the thematic section "Gender Issues". In 2013, we collected data from another national context, which was Ghana. This sample included respondents from the University of Ghana in Accra. We conducted this survey in its English language online version. The general conditions and design were the same as for the German sample and as described in section 2.2. For the Ghana study, a separate questionnaire-instance was set-up and the related link to the questionnaire was included in the letter of invitation.

In contrast to Germany and South Korea, Ghana is not a culturally-homogenous country. More than 100 different ethnic groups were united into a common national context during the periods of colonialisation. Thus, the results neither allow to draw conclusions regarding the specific societies' cultures, nor are they representative for the "general culture" in the country (whatever this might be) but just reflect this particular university's population. Due to the following reasons, we think that the results still provide an insight regarding the country's culture in *higher education*: First, students in Ghana enter the universities with more or less common experiences from their earlier education: Ghana has nine years of compulsory education, a national educational system, and a national curriculum. Teaching usually takes place in the official national language. Second, the number of public universities without particular thematic specializations is quite limited (6 public universities in total, 3 without specialization). The collected demographic data showed that students from all over the country frequently attend the University of Ghana in its capital Accra. For a specific analysis regarding particular regions, the number of responses per region was too small (306, acceptance rate 1,54 %).

4. RESULTS

In Table 1, in the first column, the original statements of the question block "Gender Issues" are displayed as they were to be evaluated on the 4-point Likert scale. On the right side are three blocks, each with three columns that display the percentage of positive female, male and average responses from the countries

Germany, Ghana, and South Korea. According to an imbalance between female and male answers, we define a deviation below 5 % (absolute) between male and female responses as standard error.

Table 1. *Gender Issues*: results of universities from 3 continents (percentage of positive answers)

	Germany			**Ghana**			**South Korea**		
	female n=544	male n=1268	average	female n=126	male n=177	average	female n=153	male n=131	average
a. Learning content should be designed in the same way irrespective of the learner's gender.	94.12	92.91	93.29	86.51	90.40	88,89	76.47	75.57	75.79
b. Women and men have the same ability in understanding complex technical information (e. g. in the domains of engineering, mechatronics).	72.61	77.07	75.78	66.67	70.62	68,95	45.10	52.67	48.42
c. Women and men have the same ability in understanding social domains (e. g. in the domains of pedagogic, gerontology or primary education).	70.77	80.69	77.77	80.95	77.40	78,76	59.48	54.96	57.19
d. Women and men are treated the same way when completing a task successfully.	56.99	54.06	54.93	66.67	74.58	71,24	40.52	48.85	44.56
e. Women and men are treated the same way when failing a task.	47.24	47.75	47.61	58.73	66.67	63,40	35.29	47.33	40.70
f. Women and men have the same chances to access studies on all subjects.	75.74	75.97	75.89	79.37	82.49	81,37	64.05	72.52	68.07
g. Workgroups intellectually benefit if the genders are represented in a well-balanced ratio.	75.92	84.16	81.67	84.13	81.92	82,68	80.39	75.57	78.25
h. A separation of gender in the learning process eases the social interaction within groups.	10.66	7.2	8.64	46.83	42.94	44,44	31.37	27.48	29.47
i. It generally is not useful to implement a quota for the number of women in supposedly men dominated areas.	27.76	46.26	40.67	52.38	61.58	57,84	40.52	38.93	40.00

Figure 2 provides the first visualization of the gender-specific differences between the responses according to the results from the thematic section "Gender Issues". We used separate bar diagrams for each country. We found 10 cases amongst the three countries, in which the answers revealed to be significantly imbalanced in the gender-specific contrasting. Across the countries, however, there was no clear-cut pattern that would suggest imbalances regarding particular items. A similar result could be found throughout the whole datasets:

In the full South Korean sample (100 items), 27 items showed an imbalance above 5 % between the responses of the female (f) and the male (m) students; regarding 2 items, the level of imbalance exceeded 10 %:

1. Gender Issues: "*Women and men are treated the same way when failing a task*." (35.29f : 47.33m)
2. Motivation: "*I am easily discouraged because of others or situations*." (48.37f : 38.17m)

In the full German sample (100 items), we found 30 items in which the imbalance between the answers of the female and the male students exceeded 5 % and amongst those, the responses in 5 cases exceeded 10 %:

1. Feedback: "*For me, it is ok when critical feedback in the learning process is given in front of my colleagues.*" (77.39f : 63.99m)
2. Motivation: "*I am easily discouraged because of others or situations*." (42.28f : 53.11m)
3. Motivation: "*I experience being motivated if the imparted knowledge is strongly needed for upcoming examinations, tests, and/or presentations.*" (56.52f : 66.67m)
4. Gender Issues: "*It generally is not useful to implement a quota for the number of women in supposedly men dominated areas.*" (27.76f : 46.26m)
5. Group Work, evaluate statements: "*It should be possible to divide a given task into subtasks with*

similar complexity for being solved solely by each participant within the group." (58.64f : 71.47m)

In the full sample of the university of Ghana, we found 29 cases where the answers from female and male students diverged accordingly (over 5 %) and in 4 cases, the 10 % were exceeded:

1. Motivation: "*I am easily discouraged because of others or situations*." (26.98f : 37.29m)
2. Group building process: "*I try not to actively exert influence on the arrangement of the group members but wait until I am invited to participate in a group*." (51.59f : 39.55m)
3. Group Work, evaluate statements: "*When working in a group, I feel confident in presenting my own opinion to the other group members*." (95.24f : 84.75m)
4. Role of the Teaching Assistant: "In my opinion a teaching assistant occupies the role of a respect person" (26.98f : 41.24m)

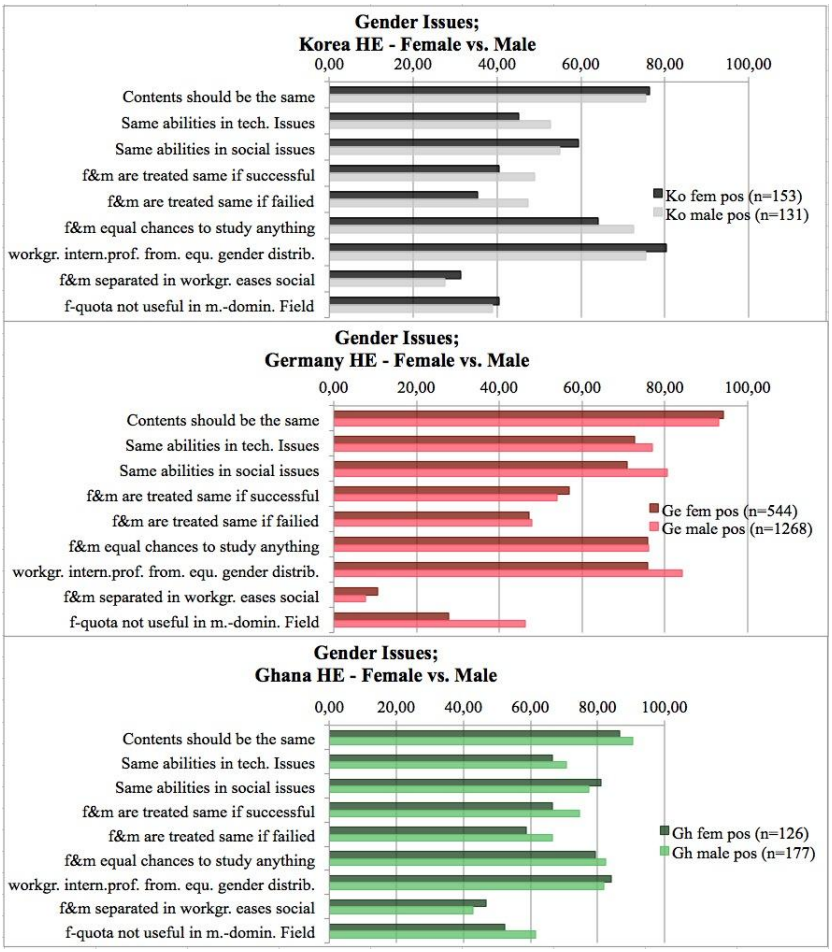

Figure 2. Gender Issues: Contrasting results from female and male students per item

There was a single item in which the responses of the female and the male students from all thee countries showed a similar high imbalance, which was "*I am easily discouraged because of others or situations*" in the thematic block "Motivation". While the level of imbalance was similar, the answers generally were not. In the South Korean sample, less female students felt the risk of being discouraged than male students. The samples from Germany and Ghana revealed the opposite. We have no explanation for this phenomenon; also Hofstede's Masculinity Index cannot provide an explanation, since in this dimension, Germany (66/100) and South Korea (59/100) are quite close to each other and Ghana is not included.

We display the results of the thematic block "Gender Issues" in a net diagram in Figure 3. It shows that between the three countries, there generally are cultural differences regarding most considered items. An exception is the item "*Workgroups intellectually benefit if the genders are represented in a well-balanced ratio*" where the distance between all three national samples is below 5 %. The largest cultural distance can

be found between Germany and South Korea (27.36 %) regarding the item "*Women and men have the same ability in understanding complex technical information (e. g. in the domains of engineering, mechatronics)*", directly followed by the item "*Women and men are treated the same way when completing a task successfully*" (26.68 % difference between Ghana and South Korea).

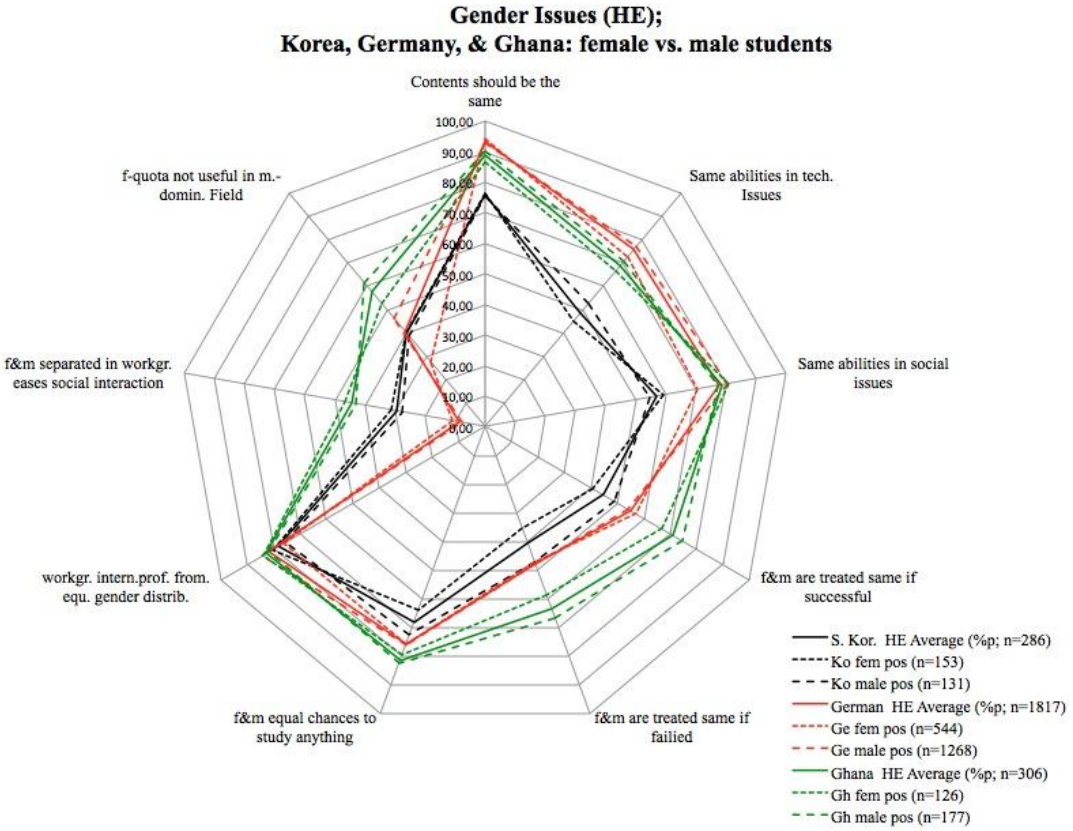

Figure 3. Gender Issues: Students' responses from South Korea, Germany, and Ghana contrasted in a net diagram

Regarding the treatment in cases of failed and succeeded tasks, a major imbalance between the female and the male students' responses from Ghana and South Korea were found. In both countries, the male students show a significantly higher confidence that both genders are equally treated than the female students. As for Ghana, this seems not to be a larger issue because both responses are in the positive interval of the scale (above 65 % positive). In Korea, in contrast, almost 65 % of the female students report an imbalance in treatment (35.29 % positive answers). In accordance of the almost 50 % of positive answers regarding easy discouragement (Motivation), this result is somewhat alarming. The corresponding result from the German sample also is not fully reassuring: Particularly regarding the treatment in case of failures, less than 50 % of all students expressed a balanced treatment according to the gender (but their assessment is similar).

According to the perceived confidence of female and male students in relation to gender-specific abilities to study in particular fields, the results were consistent across all three countries. In contrast to our expectation that male students (particularly in rather masculine societies) would generally express technological issues as their particular domain, more male students expressed that gender has no significant influence on the ability to study technical issues. Female students concordantly expressed a higher confidence that both genders can cope with study fields that are related to social issues.

5. LIMITATIONS OF THE STUDY

The general limitations of our survey have already been introduced in the sections 2.2 and 3. In this study, we applied an analysis in which we distinguished the results according to the gender of the respondents. We did not take into consideration the extent to which gender of the instructor might play a role for the students' perceptions of education. This could particularly be relevant when it comes to questions like the role and tasks of the instructor and shall be investigated in future (but separate) studies.

We did not try to explain the differences found amongst the specific cultures. Such explanations require a very profound understanding of each culture, and should keep reserved for local people. For our purposes (recognising conflict potential) it is sufficient to identify such differences.

6. CONCLUSION AND IMPLICATIONS FOR TEL

What our investigation generally showed is that analysing cultural phenomena can help recognizing patterns on how a particular society functions. However, such patterns do not reveal a complete story: Even if results can be considered representative for a society, they still do not reflect particular gender differences according to the investigated perceptions. In the context of higher education we found that even if following the same or very similar cultural patterns, such differences in perceptions of male and female students can actually be substantial. When aiming to reduce conflicts in educational scenarios and support students to keep their motivation on the highest possible level, such gender-related differences in perceptions of education can turn out to be significant and thus, need to be considered in the educational design. All reported findings of our study are relevant for both traditional education and TEL. Thus, implications and recommendations as provided in this paper can serve as recommendations for education in all settings.

Gender-related fairness regarding treatment after completed tasks in general and particularly after failure needs to be addressed in the German context. For Germany this is a major issue because what appears to be commonly recognized by both female and male students, violates the law. In the German context, no further peculiarities were found. All other items are located in the positive area, mixed gender workgroups are preferred, and the implementation of a female quota is somewhat undecided (almost normal distribution).

In the sample from Ghana, gender-related issues were all answered on a positive level from both female and male students. A higher divergence between the genders was found regarding the treatment after failing a task but both groups expressed a positive impression of fair treatment. In contrast to Germany and South Korea, students seemed to recognize a certain value in gender-separated education and workgroups.

In the context of South Korea, several items are located in the area between 40 % and 60 %, which indicates a rather individual than culturally biased evaluation. Equal treatment after finalized tasks is also an issue. Korean students do not prefer gender-separated groups but would rather have a female quota when it comes to the accessibility to male-dominant fields of study.

7. FURTHER STEPS

The Learning Culture Survey is driven forward by chance and is highly dependent on (mainly) voluntary support through universities. Since the questionnaire is to be conducted in the local languages, the availability of translated versions is a crucial precondition for investigations. Currently, questionnaire versions are available in Bulgarian, English, French, German, Greek, Japanese, Korean, Portuguese, Russian, and Turkish. All language versions are (being) implemented in our online survey system.

Due to data protection regulations, we cannot directly address the students in foreign universities. Thus, in order to proceed, we would like to invite universities from all over the world to support the Learning Culture Survey, be it through sending invitations for participation to their local students (after making an arrangement with us) or through contributing further translations. Once, the data collection in a particular university is completed, we are willing to share the results with the supporting university.

Our long-term objective is to provide our data in a publicly available database.

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